# Technology-Enabled Learning at MIT: The Students' Perspective

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## McGovern Institute for Brain Research, '12

What I want to talk about, I guess, is a little more down to earth. When I was working for *The Tech* and paying attention to all the stuff that was coming up with MOOC in late 2011 and early 2012, something I was struck by was how much enthusiasm there was for the MOOCs. But the people who had this enthusiasm didn't even seem to have ever tried the MOOC themselves. And I was really struck by that.

I'll be honest, I read Thomas Friedman's several columns in *The New York Times*, and he really gushed about these things, but never did he mention any of his personal experience with it. And I doubt Thomas Friedman sat down and actually took any of the MOOCs that he said were so amazing. And it's the MIT way to be skeptical, and it's the MIT way to see things for yourself and to evaluate them for yourself, and not just take it on the word of whoever is building the MOOCs that they're really, really great.

So that's what I wanted to do. I said, now that I'm graduating I'm not taking classes at MIT anymore, maybe I can start taking classes online. And that's a lot of what I've done in my free time since graduating last year. My friends think I'm totally nuts, but instead of watching TV, I get to watch lectures now. But it's actually a lot of fun. And what I want to talk about is what I thought was really good about some of these online courses that I took on edX and Coursera. And I've listed the ones that I've actually taken through and through. And things that I thought weren't so good and where there's room for improvement.

So first I'll start off with the positive. What did MOOCs do well? And I think they did a lot of things very well, but there are a couple of key innovations that I think are really important and which distinguish MOOCs from the courses that you might take at MIT or any of these really top-tier universities that tend to be publishing MOOCs right now. The thing I actually really like most about taking online courses is this try, try again philosophy. And it's been alluded to by, I think, a couple people here, and I'm sure you've probably heard about it in your few days here, or if you've been following MOOCs yourself. When you're taking a class on campus, you do a problem set and you write down the answer and then you hand it in and that's your only shot. As it turns out in MOOCs – well, oftentimes in MOOCs – you actually get several tries, if not hundreds of tries.

In this case, this was from a course on MITx 600x, computer science and programming. You have 30 tries to get the answer correct. You code up something which is some function which is supposed to do something, and then you submit it to an auto-grader and it checks through it. But if you get it wrong, you've got 30 chances to get it right. Which is really great because, basically, you think, well, I can almost never get anything wrong. With 30 chances I could almost use brute force and I could just take 30 guesses and the chances are I'll get it right.

And that's sort of true, but if you actually try to approach it from a more intellectual standpoint and you say, I'm not just going to brute force it, it's really great because you actually get to sort of work through in your head what didn't work, what does work, until you finally come up with the right answer, rather than just submitting a wrong answer and getting some feedback from a TA that your answer is wrong. So I thought that was really great. I put this first because I think it's one of the best innovations from MOOCs. I think it enhances the learning and I'm sure there's research into how this happens.

Going along with this, something else I found is that these little green checkmarks you get when something is correct are super addicting. There's no actual reward from it. I'm not getting paid, I'm not even getting credit for this stuff, right? It's just online. And yet, when you have all these 30 chances and you know there's a correct answer and you get it wrong, you don't just say "oh well", you can't leave. You're like, I'm not going to go and get lunch until I get this right. And then you'll sit there for two more hours and you'll keep on doing it until you get it right.

Again, it's sort of counter intuitive because I didn't expect that going in. I thought, well, I'm not being incentivized by any credit hours here or by any money, I'm just sort of doing this for my edification. And yet, those little green checkmarks are super addicting. I have to try and try and try again until you see the little green checkmark. And this is something else that you really can't get in the on campus experience where you write down an answer on your problem set, and you're not given feedback on whether you're right or wrong until like a week later when the TA has graded it. So, in on campus experience, I don't think this effect even exists.

This, I think, has been alluded to a lot. This concept for people you have probably heard talking over the past few days, but MOOCs are essentially streamlined. I find them to be more efficient information delivery systems then your traditional brick and mortar on campus classes. And that's in the sense that MOOCs cut out all this kind of "administrivia" that you need to deal with when you're in a normal campus course. You come into class, you've got to wait for everyone else to sit down, the teacher has to go over when the problem set is due, things like that. You add all that up, that's at least five to 10 minutes from each lecture, over several dozen lectures over the course of a semester, that's several hours, probably, of your time sitting around listening to stuff which is not learning, and which could be much better conveyed through a static website that tells you all the due dates.

This is a screen shot from a Coursera course – and you're familiar with this concept – where a normal lecture has been broken up into these chunks of shorter lecture segments. And all the fluff that's maybe in between them has just been sliced out. So it's more streamlined, it's more efficient and it's great because you're learning, I think, the same amount, or roughly the same amount, in the same order of magnitude, except now in less time. And to go along with that I'll say, MOOCs, somewhat, let you learn at your own pace. And I know this has been a big, well-advertised aspect of MOOCs. That the learner can find his or her own pace when it comes to learning, rather than being stuck to the pace of the on campus course. And that's not fully true in MOOCs because there's still deadlines for assignments, and lectures are still published at some regular schedule. And they usually do more or less follow how it would have been on campus, but there are a couple of tweaks. The one I liked being that you can watch lecture videos faster than real time. I don't prefer 1.5, that's way too fast, but 1.25 is a nice pace. But if you want to make it go slower you can too. And this technology is pretty good. It'll try to match the speakers tone no matter what level you're playing it, so it always sounds somewhat natural. At 1.5 it does sound a little funky sometimes, I will say that. You should try it.

So those are the innovations that I liked best. But, I think, for everything that I really liked, there was something which I thought could be a lot better. I'm going to preface this by saying the reason why I'm talking about all this is not because I think MOOCs are bad or I think MIT is doing the wrong thing by putting out MOOCs. It's actually the contrary. It's that I want MIT to succeed because I think this stuff is important and this stuff can be meaningful, as everyone has said. But, unfortunately, I don't think Thomas Friedman's method is the best way to do that. Just telling everyone that they're all awesome and not telling them how can you better is not constructive. It's not the MIT way. So that's just the preface here. I don't think MOOCs are bad, I just think that there's ways that could be better.

And the one thing, which is probably really at the top of the list is feedback. And everyone uses this word feedback, but I don't think it's often well defined. Feedback can come in different forms. And in the form it comes in MOOCs, I think, is the barest minimum form of something you can even justifiably call feedback. And that is, to an order of magnitude, the feedback is right or wrong. You did your question, you submitted the code, an auto-grader runs the code, it checks your answers against a couple test cases and it says you're correct or you're not correct. In an on campus course you could have written some horrendous code that gets the job done, but you did it in twice as many lines as you needed and it's a very clumsy or it doesn't use an elegant algorithm, and you'd still get it right. And as far as the MOOC grader is concerned, oh, yeah, you got it right.

This is a screen shot from a machine learning class from Stanford on Coursera. Feedback, nice work. Well, what could I have done better? Was my code inefficient? It didn't really measure how long it takes. Now, to be fair, I think this is one thing which everyone who's developing MOOCs is really thinking a lot about. So I point this out because this is where MOOCs, as far as I've seen, and the form MOOCs have taken, this is where they are now.

No one thinks that this is an acceptable status quo. Obviously, you want to be able to give people higher level feedback on all sorts of things.

And then when it comes to humanity in MOOCs, this is even more important, right? Because people are writing essays and people are doing short answers, and there's no objective right or wrong in that. You need to be able to give nuanced feedback. How you give that feedback is still an open question, but for everyone who takes a MOOC, I think this is the thing that you'll find to be most different and most unsatisfying relative to what you've probably taken in a college course. You want to know *more* about why you got something wrong, how you could have done it better, and even if you got it right, how was it not totally 100% optimal?

I think this has been mentioned by a couple of speakers already, too, and that's the lectures in MOOCs are sort of the same thing as what you'd find on campus, even though the space of possibilities is so much greater. No one's seemed to step into that space in a really robust way. At least not as far as I've seen. And what I mean by that is that lectures are basically the same thing that you'd get sitting here in 10-250. There's a professor, there's some PowerPoint slides, they're scribbling on the slides. They could have done that on campus. What they couldn't have done in on campus setting is do lots of interesting, or even interactive, some kind of animation. They could have brought you to another place in the world and filmed something interesting happening over there. Right?

Again, this is not something which people are unaware of, but it's something which I found to be unsatisfying. Take advantage of the fact that you're not constrained by the physical world anymore, right? Do interesting things with the lectures. And along that same line – something like what Cody mentioned – is sort of integrating more interactive aspects with lectures, note-taking annotations would be really nice.

Course organization, I want to mention this. This is not one of the bigger points, but something I discovered in 600x where the course team, for a while, seemed to actually struggle with meeting their own deadlines for when they said they would release lectures or problem sets. MOOCs are obviously works in progress, but when you're trying to scale these types of things to tens or hundreds of thousands of people, it can be challenging. And that's something which was, I guess, unsatisfying for me and some people who also took it – 600x – that there were some, at points, significant organizational problems. I can tell you more about those in detail. This is just a screen shot of the little progress indicator in edX. And I didn't really take much of the final, actually, because I was busy. But this is sort of just organization regarding when you publish all those kind of things, right? Lots of p-sets, you have to make sure they're all published at the right time, the graders are up at the right time. It's a challenge.

One last point I want to make, which is a little tangential, but it's sort of more informed by my experience working for *The Tech* than just being a student at MIT, and is something I've noticed about the whole MOOC phenomenon at MIT. The enthusiasm for

the technology does not quite seem to be matched by an equal enthusiasm for improving the campus and having the campus meet the needs of 21st century learning environment. And what I mean by that is here I'm showing you – this is the campus visioning exercise. They don't call it a plan. It's called MIT 2030 and it's supposed to be a framework for what MIT is supposed to look like in 2030. So, in 20 years from now. And the colors basically represent various types of new construction or renovation on campus. And something I'm struck by when it comes to the whole visioning framework as it stands right now, is that there's not a lot of people talking about how the campus could change to meet the needs of 21st century learning environment.

Like Sam described, if you're going to move to a model where you're doing more flipped classrooms, where people don't need to sit in these giant lecture halls anymore, where people need to do more project-based learning, where people need the resources to do that project-based learning, and where you need more faculty to do the type of instruction that Sam is talking about, the infrastructure right now doesn't meet it. This room is useless. Right? What is this room for in an age where you don't go to lectures anymore? It's totally useless. Well, except for conferences, maybe, like this. You don't need so many of them. We've got many of these lecture halls on campus. And a lot of what's described in this visioning exercise right now does not really talk about how you're going to change the campus environment to foster the type of outside learning and the project-based work that you're going to do when edX and MITx are more fully deployed. Most of this, actually, and what all the emphasis has been on – a lot of the emphasis has been on since 2030 was announced – has relied on commercial development on the campus periphery. And for a student, that's very unsatisfying to see.

Because commercial development for Novartis and Pfizer, sure, they need great new campuses, but so do the students here at MIT. And I guess I haven't seen the emphasis on that yet, but also, to be fair, there's a whole committee and task force at MIT here thinking about this and working on this, so I imagine it's quite possible that this 2030 vision will be updated. This is not set in stone, by any means, it's to sort of more meet the needs of a 21st century learning environment as I describe it. So that's basically it. Yeah.